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In the name of NOKIA CORPORATION

In response to the Written Opinion dated June 3, 2005, it is respectfully requested that the examination is continued based on the original application documents and under consideration of the following comments:

I. Subject matter of the claims

Independent claim 1 is directed at a device. This device comprises the following features:

1. A communication system transceiver for exchanging signals via a radio interface in a first frequency band.
2. A receiver for receiving signals via a radio interface in a second frequency band.
3. A processing portion detecting the presence of interfering signals in said second frequency band.
4. A processing portion determining a timing pattern for detected interfering signals based on a timing information provided by said communication system transceiver, which timing information is

indicative of the timing for transmissions employed by said communication system transceiver.

5. A processing portion causing a manipulation of signals reaching said receiver during time intervals defined by a determined timing pattern, in order to reduce a performance degradation due to interfering signals originating from a transmitter employing the same timing for transmissions as said communication system transceiver of said device.

The invention proceeds from the consideration that in most cases, an external interference is generated by a transmitter of a communication system transceiver which is connected to the same base station as the communication system transceiver of the device itself and which is rather close to the communication system transceiver of the device itself. Thus, the interfering transmitter probably uses the same timing, including the same timing advance, for its transmissions as the communication system transceivers of the device. For example, if time slots are employed for transmissions in a communication system, these time slots will be synchronized among all communication system transceivers which are connected to the same base station. The communication system transceiver of the device is therefore able to provide an exact timing information, based on which a timing pattern can be determined for a detected interference. The timing pattern can then be used for an interference cancellation with an accurate timing. The interference cancellation is performed by any suitable manipulation of signals reaching the receiver. (paragraph connecting pages 13 and 14)

The application further comprises an independent claim 12, which is directed at a corresponding method for improving the performance of a receiver.

II. Cited prior art

The examiner refers to two documents for supporting his opinion that all of the claims lack inventiveness:

WO 01/06669 A (D2)

This document relates to maintaining operation of a receiver co-located with a transmitter and susceptible to interference therefrom by anticipating the intervals during which the transmitter is active (i.e. transmitting) and then desensitizing the receiver during that interval (page 3, lines 18-22).

In an embodiment illustrated in Figure 5, a wireless communicator 90 includes a GPS receiver 42 co-located with a cellular transceiver 44. The cellular transceiver 44 includes both a transmit and a receive capability. The wireless communicator 90 further includes a cellular antenna 46 and a GPS antenna 48 that may be imperfectly isolated from each other. An AGC module 52 may reduce the gain applied to the signal at the input of the GPS receiver 42 through a multiplier 54. (page 6, line 15 to page 6, line 16; in combination with page 11, lines 8-11) Operation of the AGC module 52 is maintained through use of a processor 92, which communicates with a computer readable storage

medium or memory 94. (page 11, lines 13-15) The memory 94 includes a communication protocol program 96 that controls operations of the cellular transceiver 44 in implementing a communication session. The communication protocol program 96 is responsive to call setup information received by the cellular transceiver that, in the case of TDMA, identifies particular time slots or intervals in each TDMA frame during which the transceiver 44 can transmit. The communication protocol program 96 can thus use this knowledge to generate control signal from the processor 92 that identifies or corresponds to these transmission intervals. This control signal can then be applied to the AGC module 52 to preserve the gain value (i.e., prevent the gain value from being reduced). (page 12, lines 4-16)

In an embodiment illustrated in Figure 6, instead of using the control signal generated from the processor 92 to preserve the gain applied by the AGC module 52, the control signal is applied to a switch 74 that is configured in series with the GPS receiver 42. During a transmission interval, the control signal causes the switch 74 to open thereby electrically isolating the GPS receiver from the GPS antenna 48. (page 12, lines 13-25)

An embodiment illustrated in Figure 7 combines the approaches of Figures 5 and 6. (page 12, line 29 - page 13, line 4)

Alternative embodiments illustrated in Figures 2-4 do not comprise a processor that uses provided timing information. Instead an AGC control logic 56 is responsive to a radio signal that is transmitted by the cellular transceiver 44. The AGC logic 56 monitors the transmission signal to anticipate the beginning of the transmit interval. As a result, the AGC control logic 56 identifies the beginning of the transmit interval and generates a control signal, which is applied to the AGC module 52 to preserve the gain value that is applied to the input signal of the GPS receiver 42 through the multiplier 54. The AGC control logic 56 continues to monitor the radio signal that is transmitted to determine the end of the transmit interval, to allow the AGC module 52 to adjust the gain applied in accordance with the strength of the GPS signal. (page 8, line27 - page 9, line12)

US 6,278,723 B1 (D2)

This document relates to a method and an apparatus for minimizing a probability of self-interference among neighboring wireless networks.

A master transceiver 102 comprises a conventional receiver 202 for receiving communications from slave transceivers 104 in its own wireless network, and further for monitoring neighboring wireless networks to discover a strongest interfering master transceiver. The master transceiver further comprises a processor 204 coupled to the receiver 202 and to a transmitter 206. A memory 208 comprises a neighbor monitoring program for programming the processor to cooperate with the receiver to monitor the neighboring wireless networks to discover a strongest interfering master transceiver in one of the neighboring wireless networks. The memory also includes a hop interval

time-alignment program for programming the processor to time-align frequency hop intervals of the master transceiver with the frequency hop intervals of the strongest interfering master transceiver to ensure that a transmission of the strongest interfering master transceiver during each hop interval used by the strongest interfering master transceiver cannot interfere with the transmission of the master transceiver during more than one hop interval of the master transceiver. In addition, it may time-align receive hop intervals of the master transceiver with the receive hop intervals of the strongest interfering master transceiver. This will provide the best resistance to interference, because a neighboring master transceiver will then seldom be receiving while another is transmitting. (col. 2, line 26 to col. 3, line 13)

III. Inventiveness

Independent claims

Claim 1

The examiner was of the opinion that the subject matter of claim 1 was obvious to a skilled person considering document D1 and in addition document D2. This estimation is contested.

Document D1 discloses a device with a communication system transceiver (D1: Cellular transceiver 44) for exchanging signals via a radio interface in a first frequency band and a receiver (D1: GPS receiver 42) for receiving signals via a radio interface in a second frequency band.

Document D1 does not disclose a processing portion detecting the presence of interfering signals in the second frequency band, which is conceded by the examiner. (feature 3)

Further, even if document D1 is considered to discloses a processing portion (D1: Processor 92) using a timing information (D1: call setup information identifying e.g. transmission time slots) provided by the communication system transceiver (D1: Cellular transceiver 44), which timing information is indicative of the timing for transmissions employed by the communication system transceiver (D1: page. 12, lines 4-10), it is not disclosed in document D1 that the processor 92 of document D1 determines a timing pattern based on the timing information. As the processor 92 of document D1 is only responsible for considering the signals that are to be transmitted by the Cellular transceiver 44 itself, the provided timing information itself constitutes a readily available "timing pattern". The processor 92 is not responsible for considering detected interfering signals, which may use the same timing but another timing pattern than the Cellular transceiver 44. The embodiments described with reference to Figures 2-4 of document D1 do not deal with any timing pattern at all, as here, it is simply monitored whether a transmission starts or stops in order to take an appropriate action. (feature 4)

Further, even if document D1 is considered to disclose a processing portion (D1: Processor 92) causing a manipulation (via AGC 52 and/or switch 74) of signals reaching the receiver (D1: GPS

receiver 42) during time intervals defined by a timing pattern, this timing pattern is not a determined timing pattern. Moreover, these manipulations are not suited to reduce a performance degradation due to interfering signals originating from a transmitter employing the same timing for transmissions as the communication system transceiver of the device, because a timing pattern that is associated to the communication system transceiver 92 is employed as a basis for the manipulation. The timing pattern associated to another transmitter will usually be quite different from the timing pattern used by the communication system transceiver 92. (feature 5)

Thus, it becomes apparent that in addition to feature 3, also features 4 and 5 are not disclosed entirely by document D1.

Proceeding from document D1, it is an objective problem to be solved to further improve the performance of a receiver (page 12, 2nd paragraph of the application). This is achieved in a device according to claim 1 with features 3-5, which ensure that not only interferences caused by own transmissions can be dealt with - as in the case of document D1 - but also interferences caused by other transmitters.

The missing features cannot be taken from document D2 either.

First of all, a skilled person would not combine documents D1 and D2 for solving the problem in the first place. Document D1 does not mention the possible existence of interferences generated by another transmitter than the comprised transceiver. Thus, a skilled person proceeding from document D1 would not come to the idea that a further improvement could be achieved by dealing with such interferences and therefore not turn to a document dealing with such interferences. Moreover, a skilled person would not combine the teachings of documents D1 and D2, because document D2 does not deal with the manipulation of received signals in the presence of interference, like document D1, but rather with the synchronization of transmissions in order to avoid interferences in the first place.

A skilled person proceeding from document D1 and considering document D2 in addition nevertheless would come at the most to the idea of synchronizing the transmissions of the transceiver of the device of document D1 and the transmission of some other transmitter that might result in an interference. As a result, interferences caused by this other transmitter are dealt with automatically at the same time as own interferences. Such an approach may be suited to further improve the performance of the receiver. It is not a feasible approach for many devices, though, as it requires an amendment of the scheduled transmission times of a transceiver, which may e.g. not be in line with the specifications according to which the transceiver is operating.

Summarized, claim 1 requires means for evaluating timing information for the own transmissions to obtain a timing pattern for detected interference signals, and provides thus another solution than

achieved by a combination of the teachings of documents D1 and D2. The solution of claim 1 is also better suited for some systems.

Therefore, the subject matter of claim 1 has to be considered to be based on an inventive step.

Claim 12

As the method of claim 12 comprises steps carried out by the components of the device of claim 1, the same comments apply as for claim 1. Thus, also the subject matter of claim 12 has to be considered to be based on an inventive step.

Dependent claims

The examiner considered also none of the dependent claims to be based on an inventive step. The dependent claims have to be considered to be based on an inventive step already due to their reference to a respective inventive independent claim.

It is pointed out nevertheless with regard to **claim 5** that an evaluation of the intensity of an interfering signal in the manipulation of received signals is not disclosed in either of documents D1 and D2. This feature makes the receiver adaptable to the respective interference level (page 16, 5th paragraph of the application). In document D2, an evaluation of the strength of an interference signal is only used by a first master transceiver for determining which other master transceiver is to be selected for synchronization.

IV. Final comments

Summarized, it has been shown that the pending claims are not only novel, but also inventive. It is therefore expected that a positive International Preliminary Report on Patentability can now be issued.

For the case that, in contrast to expectations, the examiner disagrees, it is requested that a further opportunity for amending the claims is given.

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